Strathcona
Timber Supply Area

Vegetation Resources Inventory

Photo Interpretation
Project Implementation Plan

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ON BEHALF OF THE:
STRATHCONA TSA COMMITTEE

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1. INTRODUCTION

1.1 Background Information

The Strathcona VRI Committee is comprised of willing participants operating within the Strathcona Timber Supply Area, including British Columbia Timber Sales, International Forest Products Ltd., Hecate Logging Ltd., Nootka First Nations, Nootka Sound Economic Development Commission, TFL Forest Ltd., Canadian Forest Products Ltd., Raven Forest Products Ltd., Western Forest Products Inc. and Weyerhaeuser Canada Ltd.

1.1.1 VRI Overview

The VRI is a vegetation (forest) inventory process that has been approved by the Resources Inventory Committee (RIC) to assess the quantity and quality of BC's timber and vegetation resources. The VRI estimates overall population totals and averages, as well as individual polygon attributes, for timber and non-timber resources. Its design is simple, reasonably efficient, statistically defensible, and addresses issues raised by the Forest Resources Commission in its 1991 report, *The Future of Our Forests*.

The VRI consists of several components (Appendix II):

1. BC Land Cover Classification Scheme (BCLCS)
2. Photo Interpreted Estimates (Phase I)
3. Ground Sampling (Phase II) – timber emphasis, ecology, coarse woody debris
4. Net Volume Adjustment Factor (NVAF) sampling
5. Within Polygon Variation (WPV) sampling
6. Statistical Adjustment.

One or more of these components can address specific forest management or inventory issues. For more information, VRI manuals are available through the internet at http://srmwww.gov.bc.ca/risc/pubs/teveg/index.htm.

1.1.2 VRI Planning

The VRI planning process is an important component of the overall VRI process and related activities (Figure 1 and Appendix III). The intent of the VRI planning process is

to ensure that baseline products meet a range of applications and they are efficiently implemented.

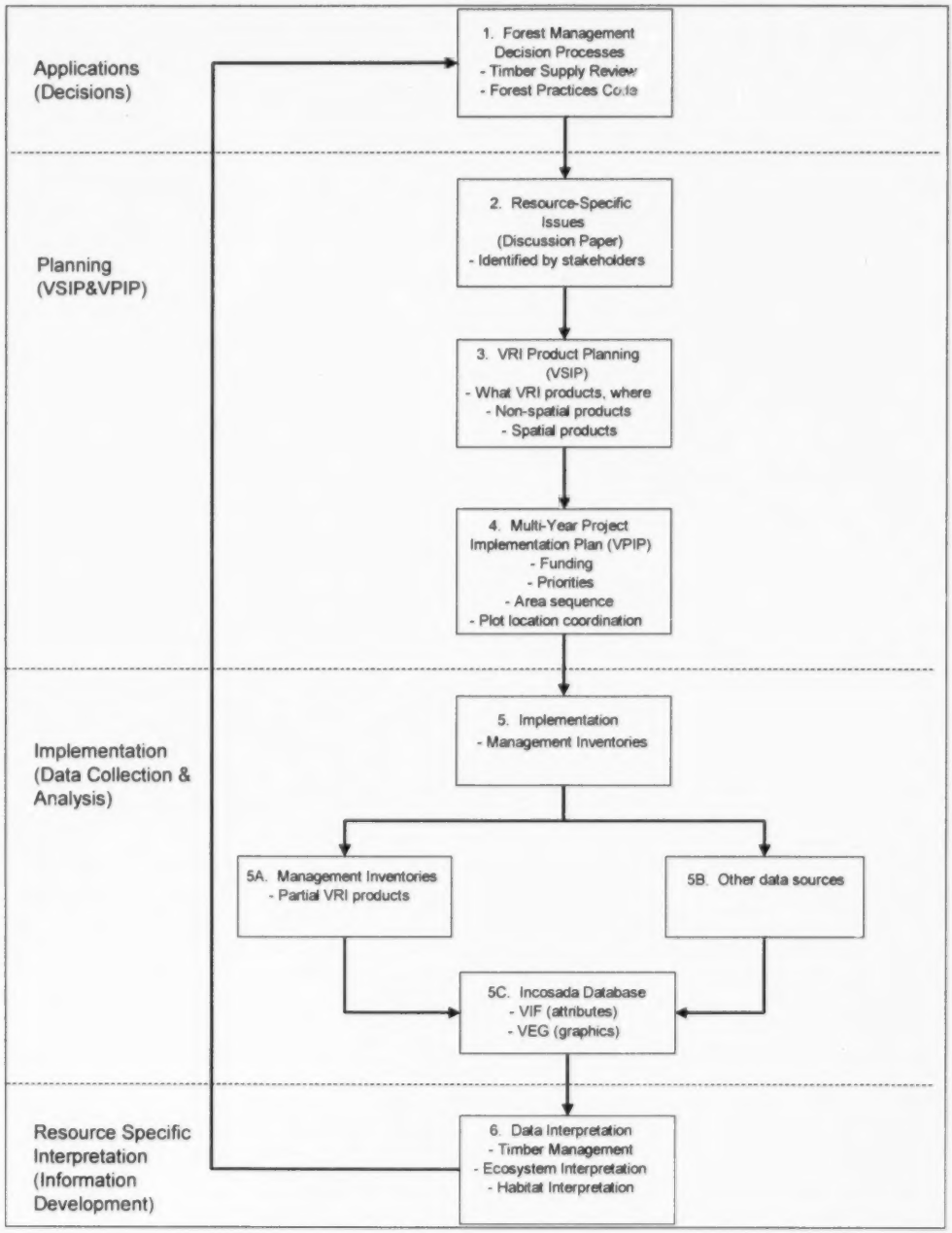

Figure 1. The VRI management inventory process.

1.2 Document Objectives

The objective of this report is to outline and describe the VRI Phase 1 activities to be completed within the Strathcona TSA. It provides some basic landbase information, some background information from the previous Annual Allowable Cut Rational document (pre-2002), and it outlines the implementation plan for the field sampling. The majority of information requested in this VPIP has already been completed in other higher level plans and related planning documents and they are indicated as links under the appropriate headings. Please refer to the documents for the necessary information.

1.3 Landbase

The jurisdiction of the Strathcona TSA covers 395,694 ha of land (Table 1). The main tree species in the forested landbase are hemlock/balsam (56%), cedar (20%), Douglas fir (18%), yellow cedar (3%), pine (1%) and deciduous (2%). In this report, we assume that the forested landbase corresponds to the Vegetated Treed (VT) landbase (BC Landcover Classification Scheme, or BCLCS).

Table 1. Landbase by forest cover.[1]

	Area (ha)	%
Forested	329,817	
Mature		46
Immature		54
NSR	12,473	
Non commercial	78.8	
Non productive	53,325	
Grand Total	395,694	

2. PHOTO INTEPRETATION PLAN

2.1 Project Objectives

The objective is to improve TSA polygon information – especially in areas where specific management issues occur – using photo interpretation. The VRI product is a spatial database consisting of unadjusted photo-interpreted estimates. Ground sampling, used to check and adjust the photo-interpreted estimates, is discussed as a separate process

[1] Data from the TSR 3 spatial database.

2.2 Target Area

All TSA lands outside of protected areas will be updated to VRI standards through new photo interpretation (including woodlots). Some small protection areas found within larger TSA parcels will be mapped for completeness.

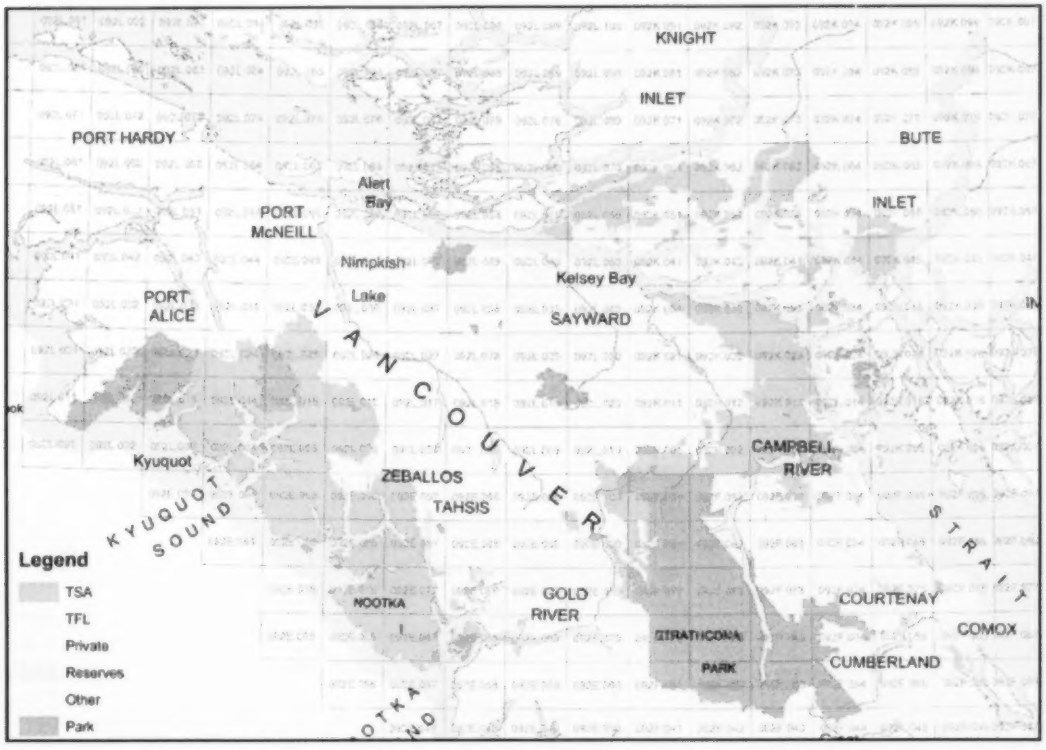

Figure 2. TSA 37 (Strathcona TSA)

2.3 Calibration Data Sources

The sampling ratio of air calls and single-point ground calls as well as specific strata is undetermined at this time due to a data source and trend analysis being undertaken by a consultant. This information will not be available until they are complete. The objective is to provide a statistical defensible sample design that will ensure among other things, cost efficiency in the sampling design. Any further information about this initiative is to be directed to the VRI Project Coordinator (Section 3.2)

For more information on this topic please refer to the following;

- VRI Air Calibration Data Collection Procedures and Standards (2003);

- VRI Ground Calibration Data Collection Procedures and Standards (2004);

Or, use the following links:

- http://srmwww.gov.bc.ca/risc/pubs/teveg/aircalibration2k3/air_call_procedures2k3.pdf
- http://srmwww.gov.bc.ca/tib/vri/vri/standards/photo_interp/vri_pi_gcall_2k4.pdf

2.4 Inventory Documentation and Archive

The Strathcona TSA was re-inventoried in two projects, dating from 1987-1992. In the first project, data for the Kyuquot Supply Block was compiled in 1987-88 utilizing 1986 1:15,000 black and white aerial photography. In the second project, forest cover for the Sayward and Loughborough Supply Blocks was re-inventoried in 1991-92 utilizing 1:15 000 black and white aerial photography that was acquired in 1991. A disturbance update of the TSA was completed in 1996 utilizing 1:40,000 black and white aerial photography.

In 2002, the Artlish-Tashish area in the Kyuquot Supply Block was flown with 1:25 000 color photography in conjunction with TFL 37. This photo was scanned and used to complete VRI photo interpretation for the Artlish and Tashish landscape units (incl. Schoen Lake Park) via softcopy. This work will be incorporated with the remaining photo interpretation work covered by this plan. The ground and air call program will include this previous work to ensure a consistent and a seamless phase 1 inventory will be produced prior to preparing the ground sampling program.

There have been no inventory updates since 1997. The MoF have completing an "ad hoc" update for TSR 3 using Landsat imagery, forest cover and FDPs. They have used the imagery to develop the depletion polygons, then developed an age class distribution and applied it to these polygons. The regular updates still need to be completed.

Uncertainty with regard to the forest inventory initiated an audit that was completed in 1999. The audit reviewed tree height, age and volume for forest stands greater than 60 years old. It also reviewed height, age and productivity for immature stands. Audit results showed that audit and inventory volumes were 591 m3/ha each, whereas the ground attribute volume was 521 m3/ha. The difference between the audit and the ground attribute volume is called the model bias (attributed to VDYP). On the other hand the difference between the ground attribute and inventory volume is equal to the attribute bias (i.e. the bias associated with the inventory classification attributes). Adding these biases together yields the total bias, which in this case is zero, since the model and attribute bias offset each other exactly.

The inventory classification results for old growth timber measured accuracy at 62%, within reasonable limits. However, only 30% of the growth type assignments for second growth timber matched the corresponding audit growth type group assignment. Improvements are required in the species classification of the immature component of the inventory, since only 30% of growth types are "growing" on the right yield curves. This issue is of considerable concern given that 90% of the forested area in the Sayward Supply Block is second growth timber and the need to harvest more timber in this block in the very near future.

In preparation for TSR 2, Timber Supply Branch re-stratified the audit samples and analyzed plots found within the timber harvesting landbase, instead of the operable and inoperable landbases. Their results showed a 13% volume over-estimate, but only in the "eastern" part of the TSA (Sayward and Loughborough Supply Blocks). Therefore, short term timber supply estimates were forecast to remain unaffected because this error only affects 5% of the THLB. However, mid-term harvests were forecast to decrease.

In preparation for a new inventory, 1:25 000 color photo was acquired in 2002 for a portion of the Kyuquot Block. The rest of the Strathcona TSA was flown with 1:15 000 color photography in 2003.

3. PROJECT IMPLEMENTATION

3.1 Scheduling

We propose to complete the phase 1 component of the vegetation resources inventory of the Strathcona TSA over a two-year period. Activities for the first year will include:

- Photo preparation;
- Polygon delineation;
- Mono-restitution;
- Analysis of data sources (Gap Analysis); and,
- Sample Plan design.

The fieldwork for the project area will be completed in 2005. Activities for the second year will include;

- Field Data Collection;
- Polygon Descriptions;
- Final Digital Mapping; and,
- Final Deliverables

Table 2 provides a summary of delivery schedule, by phase.

Table 2 - Summary of Estimated Delivery Schedule by Phase for the Strathcona TSA

Fiscal Year	Photo Preparation	Polygon Delineation	Digital Map Production	Sample Design	Field Data Collection	Polygon Descriptions	Final Digital Mapping and Deliverables	Quality Control
2004	July 30	Sept. 30	Nov 30	Mar 30	n/a	n/a	n/a	Continuous
2005	**Completed**	**Completed**	**Completed**	**Completed**	June 30	Sept 30	Dec 15	Continuous

3.2 Project Coordination

David Byng, RPF (Project Administer)
Manager, Timber Supply and Planning
Western Forest Products

Warren Nimchuk, RPF (Project Manager)
Vancouver Branch Manager
Timberline Forest Inventory Consultants

Frank Scheithauer, RPF (Project Supervisor)
Inventory Forester
Timberline Forest Inventory Consultants

Table 4 provides a broad overview of the corporate team assembled by Timberline.

Table 4 - VRI Photo Interpretation and Digital Mapping Team

Company	Responsibilities
Timberline Forest Inventory Consultants Ltd.	Proponent Contractor for VRI
JS Thrower	Sub-Contractor for VRI
Kerley & Associates	Sub-Contractor for VRI
Vancouver Island Helicopters Ltd.	Helicopter subcontractor
Accumap Mapping Ltd.	Digital mapping subcontractor

3.3 Quality Assurance

A comprehensive Quality Control program will be completed to ensure that a consistent and reliable product is produced. The objective is to complete a seamless database where the work produced by any one photo interpreter is indistinguishable from the work produced by another.

For more information, VRI QA guidelines are available through the internet at

- **http://srmwww.gov.bc.ca/tib/vri/vri/standards/photo_interp/pi_qa_procedures_2k4.pdf**

3.3.1 Reference Material

The following material is readily available for the project:

Summary of the project specifications;

- WFP's Strathcona TSA *Request for Proposal* (2004);
- Strathcona TSA VRI Strategic Inventory Plan (2004);
- VRI BC Land Cover Classification Scheme (2002);
- VRI Photo Interpretation Procedures (2002);
- VRI Quality Assurance Procedures for Photo Interpretation (1998);
- VRI Photo Interpretation Standards (1998);
- VRI Air Calibration Data Collection Procedures and Standards (2003);
- VRI Ground Calibration Data Collection Procedures and Standards (2004);
- MSRM Vector Cleaning Specifications (1997).
- BC Ministry of Forests' Inventory Manual;
- BC Ministry of Forests' Biodiversity Guidebook;
- BC Ministry of Forests' Color Stereogram Handbook;
- BC Ministry of Forests' Black and White Stereogram Handbook;
- Several tree and plant identification field guides.
- Forest District Silviculture Opening History records (provided by MSRM 2004)

3.3.2 Data Source Transfer

The Project Supervisor will ensure that all personnel are familiar with the project's data source transfer procedures and that all work performed meets WFP's standards and specifications and the MSRM standards and specifications.

The Project Supervisor and the photo interpreter will jointly review and/or amend 100% of the data source transfer for each mapsheet until the Project Supervisor is satisfied

that the quality of the work meets WFP's standards and the MSRM standards and specifications.

The Project Supervisor will then check approximately 10% of the material transferred for all subsequent mapsheets. This review will be conducted on a daily basis as the work is being completed. The Supervisor will either approve the product or return the work to the photo interpreter (with instructions regarding the revision of items that do not meet standards).

3.3.3 Polygon Delineation and Polygon Descriptions

The Project Supervisor will ensure that all personnel are familiar with the project's polygon delineation (even though we anticipate the use of one certified VRI photo interpreter for this task) and description procedures and that all work performed meets WFP's standards and specifications and the MSRM standards and specifications.

The Project Supervisor and the photo interpreter will jointly review and/or amend the required percentage of the polygon delineation and descriptions for each mapsheet until the Project Supervisor is satisfied that the quality of the work meets standards. All quality control documents for these tasks will be signed and sealed by a Registered Professional Forester.

3.3.4 Ground Calibration Points

A field data collection workshop will be held in the project area prior to the commencement of the field data collection program. Attending will be:

- Project Manager and Project Supervisor;
- VRI Photo Interpreters;

Invited attendees will include:

- WFP Contract Administrator (or designate);
- Quality Assurance Contractor (if applicable);
- MSRM representatives (if applicable).

The purpose of the workshop is to ensure that all personnel involved in field data collection, monitoring or evaluation have a common understanding of the standards, specifications and procedures that will be employed during the field data collection

phase of the project. The workshop will ensure that vegetation attributes are consistently field estimated or classified by field data collection staff.

The Project Supervisor will independently field check 2% to 10% of the ground calibration points established by each sampling crew, as they are completed. He will either approve the product or return the work to the sampling crew (with instructions regarding the revision of items that do not meet standards

3.3.5 Air Calibration Points

All Air Calibration Points will be established by experienced VRI Certified photo interpreters. The Project Supervisor will independently field check 2% to 10% of the Air Calibration Points established, as they are completed. This will ensure that all air Calibration Points established will be consistent and conform to WFP standards and specifications and the MSRM standards and specifications.

3.3.6 Hard Copy Quality Control Procedures

The following check procedures will be implemented:

- plot all hard copies at the appropriate scale;
- check that all planimetric features and management boundaries have the correct nomenclature, all cadastre have the correct identification numbers, and all forest polygons have the correct unique numbers;
- check that all data sources have been transferred to the exact locations and have the correct numbers where applicable;
- check that flight lines and photo center numbers are correct;
- check that the geographic grids, map numbers, map surround and title block information are correct;
- check all joins along the neat lines;
- indicate all errors in red;
- incorporate all indicated changes to digital files;
- repeat plotting of paper hard copies for final checking; and
- submit clean check copies with documentation to WFP.

3.3.7 Digital Quality Control Procedures

The graphic file will be checked for the integrity of the file structure to ensure that there are no corrupt elements or missing pointers internally. A further check will be made to ensure that the data entered meets the criteria defined in the MSRM standards and

specifications by checking the parameters that are entered on each layer or theme. A log report indicates the type of errors found on each level.

In order to produce the VIF (VRI equivalent to the Forest Inventory and Planning File (FIP), the overlay themes must have closed shapes and unique nodes before the information is combined to produce a resultant file.

The following reports will be created with the check plots to ensure that all the VRI polygons have node numbers and labels:

- a hard copy hectare report, sorted by text node nur ber, of the area in hectares of all polygons on each level (HEC);
- each level (UTM node lists);
- a hard copy report, sorted by text node number, of the UTM location of all forest cover text nodes on the log file of the forest cover label placement on level 10 that indicates that there are no missing or duplicate labels and/or text nodes; and
- a hard copy report sorted by text node number and overlay level, of all the text nodes and attached attribute key-ins for all overlay levels in the design file (Overlay/Attribute Report).

3.3.8 Quality Control Documentation

Quality Control documentation will be maintained for each work phase of the Strathcona project and will be forwarded to the WFP Contract Administrator.

3.3.9 Deliverables

Upon completion of the all VRI phases (photo interpretation, ground/NVAF sampling and attribute adjustments) the following items will be delivered to MSRM:

- Digital map and attribute data
- All new document photos created
- New and old data sources used
- All archival data and photos provided by MSRM

3.4 Approval/Sign-off of VPIP

Suggested sign-off contacts are:

Agencies	Contact
MSRM Terrestrial Information Branch	Jon Vivian
MSRM Nanaimo Contact Centre	Debbie Narver
MOF Campbell River Forest District	Rory Annett

Licensee Contacts:

Licensees	Contact
BC Timber Sales	Bruce McKerricher
Canadian Forest Products Ltd.	Patrick Bryant
Hecate Logging Ltd.	Paul Pashnik
International Forest Products Ltd.	Gerry Sommers
Nootka First Nations	Dean Wanless
Nootka Sound Economic Development Corp	Cliff Lovestrom
Raven Lumber Ltd.	John Howe
TFL Forest Ltd. (TimberWest)	Jim McPhalen
Western Forest Products Inc.	David Byng
Weyerhaeuser Company Ltd.	Peter Kofoed